

Management Guide for **Tomentosus Root Disease**

Inonotus tomentosus (Fr.) Teng.

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Hosts:

Primarily

- Engelmann spruce
- Blue Spruce
- Lodgepole pine
- Western Larch

Tomentosus root disease has caused over 20% volume loss in some spruce stands in southern Utah

Introduction

Inonotus tomentosus infections of tree roots may result in mortality, premature windfall, growth reduction, and butt cull. Tomentosus root disease is common in Canada and the northern United States, but also found in pockets throughout most of the Intermountain Region and the Rocky Mountains, and in the eastern United States.

Inonotus tomentosus is primarily a pathogen of spruce forests, (*Picea engelmanni* and *P. pungens*) but it also infects western white pine (*Pinus monticola*), Douglas-fir

(*Pseudotsuga menziesii*), Western hemlock (*Tsuga heterophylla*), Western larch (*Larix occidentalis*), Ponderosa pine (*Pinus ponderosa*), as well as grand and subalpine fir (*Abies grandis* and *A. lasiocarpa*) are all susceptible in at least part of their range. Lodgepole pine (*Pinus contorta*) is an important host in some parts of North America. The disease is often called “stand opening disease” in spruce stands, and red root and butt rot in other hosts.

Key Points

- Infected sites and stands can not be “cured”
- Manage for resistant species on infested sites
- Tomentosus disease pockets may harbor spruce beetle populations

Tomentosus Root Disease Management

1. **Prevention.** Regenerate infected sites with resistant species.
2. **Inoculum reduction.** Results are mixed, but removal of infected stumps and as many of the roots as possible may reduce damage in subsequent stands.
3. **Intermediate Harvests.** Precommercial and commercial thinning should favor resistant species. Selective removal of symptomatic trees, leaving susceptible residual stands, will not effectively control the disease.

Damage

Trees infected by tomentosus root disease are often reservoirs for endemic level populations of spruce beetles and spruce engraver beetles.

Tree-to-tree spread of the disease and windthrow of infected trees results in expanding openings in the stand. These openings and windthrow are often the easiest ways to determine if tomentosus root disease is present.

Attack by *Inonotus tomentosus* on tree roots may result in mortality, premature windfall, growth reduction, and butt cull. In southern Utah, survey estimated volume loss at over 20% in larger trees (Guyon 1997). Similar levels of infection and mortality have been reported in other areas. Surveys in 70 to 111-year-old white and black spruce stands in Saskatchewan revealed volume losses averaging 28 percent due to root rot-caused mortality and cull (Whitney, 1973).

Canadian researchers have found that site factors influence disease incidence and that the most

important site factor is soil moisture regime as influenced by slope position and soil texture (Bernier and Lewis 1999).

In southern Utah, *I. tomentosus* appears to be largely confined to a narrow elevational band in stands containing both blue and Engelmann spruces.

Trees infected by tomentosus root disease are often reservoirs for endemic level populations of spruce beetles (*Dendroctonus rufipennis*) and spruce engraver beetles (*Ips pilifrons*). If populations of spruce beetles build up, they can cause landscape-scale outbreaks and mortality.

Life History

Disease centers are initiated either by basidiospores, which can infect wounded roots, or by mycelium from diseased roots left from the previous stand. The fungus may survive in buried roots for over 30 years following the death of the host. In the arid Intermountain west, the production of sporocarps (fruiting bodies) is rare. When found, the fruiting bodies are one of the few ways to positively identify tomentosus root disease on standing live trees without root excavation or boring.

The main spread within a stand is by root contacts between healthy and diseased roots. This rate of spread averaged about 20 cm/year in Canadian studies (Hunt and Peet 1997). Following initial infection, the fungus typically moves up the center of the root, eventually spreading into other major roots.

Within a year of infection, a chocolate to red-brown discoloration, often with a reddish

pink margin, develops in the wood of infected roots. This symptom has shown up first in the lower portion of the roots in spruce surveyed in Utah. The decay, a white pocket rot, is discernable about 18 months after infection.

Decay of main supporting lateral roots greatly reduces windfirmness and may lead to windthrow of green trees.



A brown stain in the center of a root develops in advance of tomentosus decay.

TOMENTOSUS SPOROCARPS



Sporocarps are annual; produced during the fall or late summer after periods of high rainfall. They are small (about 1 to 4-inch diameter), firm yellow-brown with a pale buff pore layer underneath. They usually have a central stalk up to 1.5 inches tall and can be found on the ground surrounding infected spruce.

Tree-to-tree spread of the disease and wind-throw of infected trees results in expanding openings in the stand. These wind-thrown trees are often the easiest ways to determine if tomentosus root disease is present. The exposed roots of wind-thrown trees can then

be easily checked for typical discoloration and decay.

Diagnosis of tomentosus root disease is easiest in wind-thrown trees. Exposed roots can be checked for typical discoloration and decay.

Management

Root rot caused by *Inonotus tomentosus* can be called a “disease of the site,” since the pathogen survives for extended periods of time in woody material and can infect susceptible regeneration on the site. Therefore, harvesting infected stands and regenerating with susceptible species perpetuates the disease. Poor planting practices that result in dead or deformed roots have led to infection by *I. tomentosus*.

Stand management recommendations in the literature are limited to the following: clear-cutting heavily infected stands, converting to hardwoods or less susceptible conifers, and utilizing

proper planting techniques to avoid deformed roots. Some attempts have been made at selective harvesting of root disease pockets plus a buffer strip, but with mixed results. Stumping and push-felling of infected trees has been tried in some areas, but the results are not yet conclusive. Cutting only symptomatic trees will salvage potential mortality but will not reduce spread of the disease to the remaining trees.

Aspen and most hardwoods are not infected by *I. tomentosus*. If areas with root disease are regenerated with hardwoods, the fungus is deprived of suitable host material as the spruce roots decay.

Tree symptoms

Often difficult to discern, but can include:

- Reduced internode length
- Short needles
- Abnormal curling of branches
- Chlorotic foliage may not appear until 40 percent of the roots are dead
- Basal resinous
- Predisposition to windthrow

Other Reading

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Harvesting infected stands followed by regeneration with susceptible species will perpetuate the disease.

**Forest Health
Protection and State
Forestry
Organizations****Assistance on State
And Private Lands**

Montana: (406) 542-4300

Idaho: (208) 769-1525

Utah: (801) 538-5211

Nevada: (775) 684-2513

Wyoming: (307) 777-5659

N.Dakota: (701) 228-5422

**Assistance on
Federal Lands**

US Forest Service

Region One

Missoula: (406) 329-3605

Coeur d'Alene: (208) 765-7342

US Forest Service

Region Four

Ogden: (801) 476-9720

Boise: (208) 373-4227

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